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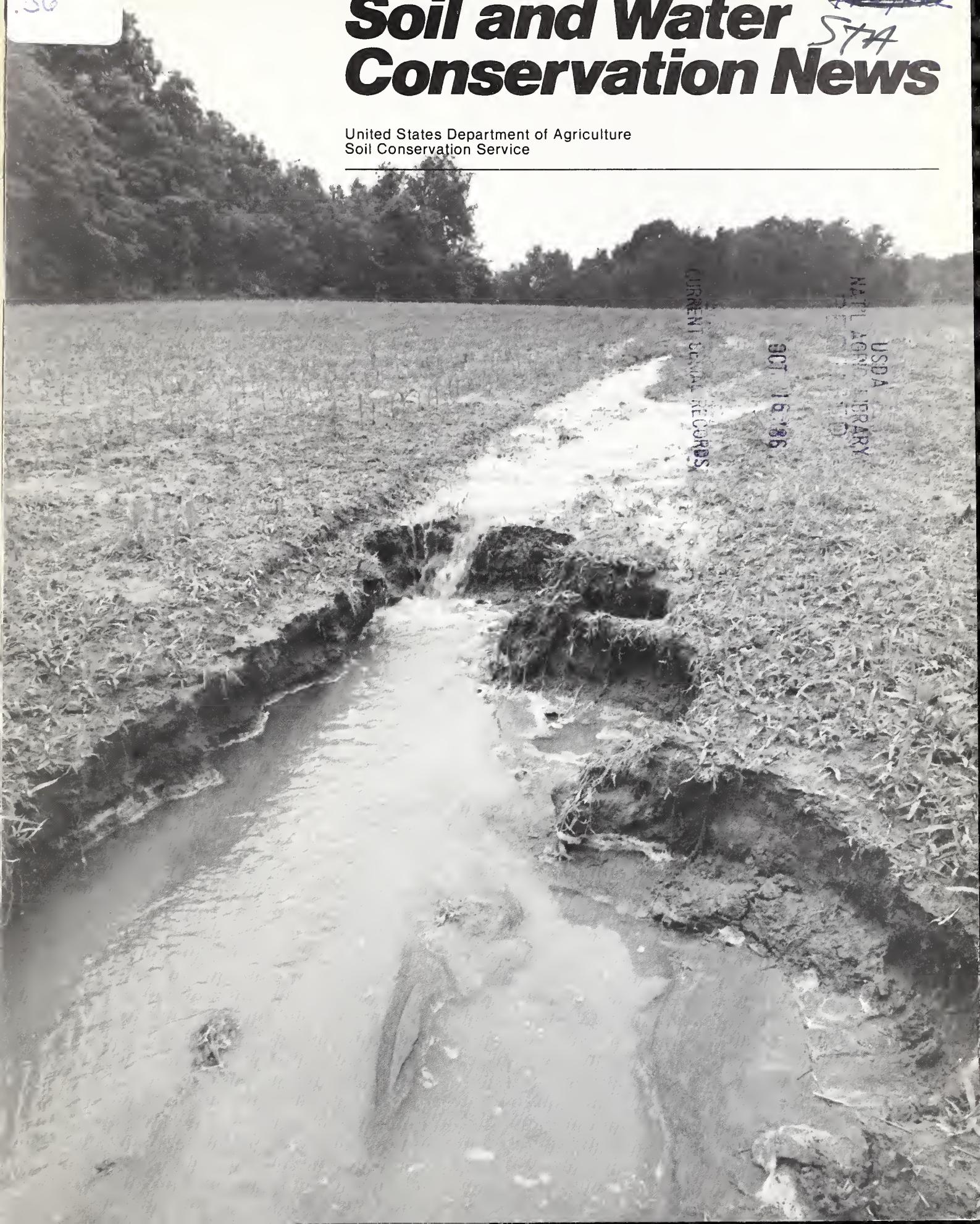
Soil and Water Conservation News

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Soil Conservation Service

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Comments: From the SCS Chief

Improving Our Ability to Measure Soil Erosion

The Soil Conservation Service has made extensive use of the Universal Soil Loss Equation (USLE) and the Wind Erosion Equation (WEQ) to estimate soil erosion.

Conservationists use the soil loss estimates derived from the USLE and the WEQ to develop alternative resource management systems. When they are applied, the systems reduce soil loss to tolerable levels.

These equations become more important as SCS strives to meet its responsibilities under the conservation title of the Food Security Act of 1985. Under the act, SCS, when requested by a land user, determines whether land is highly erodible and thus eligible for the Conservation Reserve Program. SCS also determines whether land is highly erodible and subject to the conservation compliance provision or the sodbuster provision if a land user wants to participate in certain U.S. Department of Agriculture (USDA) farm programs.

Research has provided additional information on the soil erosion process since the last major revision of the USLE in 1978. It is, therefore, timely that work is underway to update the USLE and, additionally, to develop procedures for estimating ephemeral gully erosion on cropland.

USDA's Agricultural Research Service (ARS) is updating the USLE with assistance from SCS and other agencies. A first draft of the updated manual for users is expected to be completed in 1987.

Meanwhile, ARS has begun a long-range project to develop an improved water erosion prediction model. Emphasis is on estimating rill and interrill erosion and on erosion caused by concentrated waterflow. Cooperating in this project are SCS, the USDA Forest Service, the U.S. Department of the Interior's Bureau of Land Management, the State agricultural experiment stations, and the U.S. Department of Energy. Efforts are also underway to develop an improved wind erosion prediction model.

We in SCS, as the major users, look forward to this improved technology. It will help us give better conservation technical assistance to conservation district cooperators and others who depend on us for this help.



Cover: Gully erosion on a West Tennessee farm following a rainstorm.
(Photo by Tim McCabe, photographer, SCS, Washington, DC.)

Richard E. Lyng
Secretary of Agriculture

Wilson Scaling, Chief
Soil Conservation Service

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The Universal Soil Loss Equation—Where It Came From, Where It's Going

Soil conservationists in many countries today make use of the Universal Soil Loss Equation (USLE) to predict soil loss from erosion by rainfall and runoff on agricultural land.

Developed by U.S. Department of Agriculture (USDA) specialists and cooperating university scientists, the USLE grew out of efforts started in 1940 to develop a soil-loss estimating procedure for the Corn Belt. This resulted in a procedure called the slope-practice method.

Austin W. Zingg, a Soil Conservation Service soil conservationist, later a USDA Agricultural Research Service (ARS) technical staff specialist, described the equation in an article in *Agricultural Engineering* in 1940.

Dwight D. Smith, ARS agricultural engineer, soon added crop and conservation practice factors and the concept of a specific soil loss limit to Zingg's equation. Smith also developed a graphic method for determining effective conservation practices on selected soils in the Midwest.

Other scientists added soil and management factors to the equation and prepared a set of tables to simplify its field use in Iowa. At about the same time, SCS specialists worked successfully with scientists in the north central States to develop the slope-practice equation for use throughout the Corn Belt.

After 1945, a number of publications reflected the research work that had been done to develop a universal soil loss equation during World War II. A national committee met in Ohio in 1946 to adapt the Corn Belt equation to cropland in other regions. This led to the addition of a rainfall factor to the equation.

This new formula became known as the Musgrave equation, for G. W. Musgrave, an SCS research specialist. The formula was widely used to estimate gross erosion from watersheds in flood abatement programs. SCS also began to use it at about that time in the northeastern States.

The ARS National Runoff and Soil Loss Data Center was established in West

Lafayette, Ind., in 1954 in cooperation with Purdue University, to carry out erosion studies. The center assembled a very large amount of information, then summarized and analyzed it: more than 10,000 plot-years of basic runoff and soil loss data, available from Federal and State cooperative research projects at 49 locations. ARS later sent out rainfall simulators from bases in Indiana, Georgia, Minnesota, and Nebraska to a total of 16 States to obtain additional information.

Walter H. Wischmeier was another name intimately associated with the USLE in those and many succeeding years. He devoted much of his career as professor of agricultural engineering at Purdue and as ARS research statistician to studying soil erosion. He and Smith were the developers of the USLE as we know it today. They developed the first USDA handbook, issued in May 1965, to explain the USLE and how it could help in conservation planning. They also prepared an update of the manual in 1978, the version still in use today.

The USLE included several improvements: a rainfall erosion index based on local rainfall characteristics; a quantitative soil erodibility factor evaluated directly from soil property data, independently of topography and rainfall; a method of evaluating cropping and management effects in relation to local climate; and a method of accounting for the effects of interactions among crop system, productivity level, tillage practice, and residue management.

Other ARS scientists were among the researchers who became well known in the 1960's and 1970's for their contributions to the growing store of knowledge about basic soil erosion processes: Calvin K. Mutchler, for adapting the USLE to the Delta area in the Southeast; A. P. Bonnett, for adapting it to the southeastern Piedmont and the Coastal Plain; Donald K. McCool, for adapting it to the Pacific Northwest; and Kenneth G. Renard, who adapted it for use on rangeland.

William C. Moldenhauer also made contributions while serving as head of the ARS National Soil Erosion Research Laboratory (NSERL). This lab was established in West Lafayette, Ind., on the Purdue University campus in 1981.

George R. Foster is one of several scientists now doing fundamental research on erosion processes at NSERL. He also is leading the effort to revise the USLE handbook and, simultaneously, he is serving as leader of the USDA Water Erosion Prediction Project (WEPP). The WEPP is unique: It is the first time that so many ARS research centers and so many agency users have combined forces to deliver a new technology.

If commitment and expertise make the difference in finding answers to the questions remaining about soil erosion by water, Foster and his associates in WEPP are bound to find them.

Nadine E. Pitts,
writer-editor, Public Information Staff, SCS, Washington, DC.



A Purdue University graduate student collects bottles of runoff at the bottom of a slope under a rainfall simulator at the ARS National Soil Erosion Research Laboratory in West Lafayette, Ind. The sediment content of the runoff will be measured and recorded. A furnace filter (left background) is used to duplicate the effect of 100-percent ground cover.

Conservation Features

Improved Irrigation Protects Water Supply

When it comes to water quality, everyone in Suffolk County, N.Y., on the eastern end of Long Island, is in the same boat. The county's 3 million residents, including fruit, vegetable, and nursery crop growers, obtain their water from a single underground aquifer.

Although the area receives about 45 inches of precipitation a year, not enough rain comes during the summer growing season for most of the county's crops. As a result, local growers must irrigate.

But irrigation must be done properly if it is to meet the needs of the crops and protect water quality. The sandy soils in Suffolk County have a very low water-holding capacity. Irrigation applications should be light and frequent. Otherwise, over irrigation can leach valuable nutrients from the root zone and degrade water quality. Excess irrigation water can also wash sediment and other pollutants into estuarine areas.

Most of the irrigation systems in the county are portable pipe sprinkler systems, and a major problem is the use of different nozzle sizes. This results in different rates of application and can cause wet spots and dry spots in a field.

Portable pipe also tends to leak because it's difficult to properly connect pipes that run across uneven ground. Leaks waste water and make it difficult to maintain proper water pressure in the pipe. As a result, water is applied unevenly, which reduces crop quality and yield. Leaks also cause soil erosion.

SCS, the Suffolk County Soil and Water Conservation District, and the U.S. Department of Agriculture's Agricultural Stabilization and Conservation Service (ASCS) and Cooperative Extension Service recently began a project to provide the growers with technical and financial assistance to improve their irrigation systems and practices. The goal of the project is to help the growers improve their operations while protecting Long Island's fragile water supply.

After a grower requests assistance, specialists from SCS and the district conduct an onsite investigation. They measure how much and how fast irrigation water is applied, how evenly it is distributed, and how efficiently the system uses labor, energy, water, and time. Containers are placed at regular intervals within the test area to collect water during irrigation. The volume of water in each container is measured to check the application rate and evenness of distribution.

Allan Connell (left), SCS district conservationist in Riverhead, N.Y., and Tom McMahon, a district technician with the Suffolk County Soil and Water Conservation District, check water pressure at selected sprinklers along a wheel roll irrigation system. Irrigation system evaluations are the first step in a project intended to help farmers improve their irrigation efficiency.

The specialists then recommend any changes needed to make the system more efficient and help the grower to develop an irrigation water management plan.

Cost-sharing funds are provided by ASCS, which in 1985 provided a total of \$42,000 to help 13 farmers improve their systems. "The district designed, laid out, and checked irrigation systems that our office had approved for cost sharing," said Frank Bender, the ASCS representative in Suffolk County. "Farmers can receive up to \$3,500 in assistance," he said. "So far, most of the money has gone to farmers installing underground mainlines."

Underground mainlines have several advantages. They conserve water by eliminating leaks in portable distribution lines and protect the quality of groundwater by reducing the leaching of fertilizer and pesticides. Growers can irrigate more frequently and apply less water per irrigation.

"Installing underground mains was the best thing I ever did," said Avery Young, a potato grower in Aquebogue who received assistance in the project. "I used to spend much of my time moving portable pipe. I never felt comfortable irrigating at night for fear of the portable pipe coming apart and flooding my field."

John Kujawski and his brother Ray farm more than 500 acres, growing potatoes, onions, and grain. They irrigate with wheel roll systems, water guns, and portable sprinkler systems, and they recently installed 1,060 feet of irrigation mainline.

"SCS helped us to develop a management plan so that we know how long to operate our systems and how much water we are applying," said Ray Kujawski. "Now we can irrigate one field in half the time it used to take."

A lot of people in Suffolk County depend on growers like Young and the Kujawski brothers—not only for the crops that they grow, but also to help protect the quality of the water that they all share.

Allan Connell,
district conservationist, SCS, Riverhead, N.Y.

Jean Krebs,
information assistant, SCS, Syracuse, N.Y.



Nursery Operator Sows Grass, Sets Example

Harry Park is planting more than grass. He's planting an idea.

Park is a nursery operator in Multnomah County, Oreg., who sows field brome between his rows of ornamental plants to protect the soil from erosion. He hopes the idea catches on.

Although Park is convinced that field brome is one of the best cover crops he's used, there aren't enough people using it yet to assure a good market for the seed. So, while Park has been enthusiastic about field brome for quite a few years, he hasn't always been able to get the seed.

The Park Nursery first started using field brome in 1975 when the local field office of the Soil Conservation Service obtained seed for a trial planting. Park tried the field brome, found it to be an excellent cover crop, and used it for several years until he could no longer find a commercial source for the seed.

Unable to get field brome, Park used other cover crops, such as cereal grains, but found they were harder to control and had to be mowed. Then, a couple of years ago, when SCS Soil Conservationist Jan Jinings was making a routine call on the nursery, Park asked where he could get field brome seed again.

Jinings made some calls and found that a farmer in nearby Yamhill County had agreed to plant field brome for seed on 4½ acres. This planting produced about 4,500 pounds of seed—much more than expected and enough so that several other nurseries could try the brome. Cost of the field brome is competitive with the more often used cereal grains.

The brome doesn't grow well between shade trees, but Park finds it to be the best cover crop he has used in the narrow (5-foot) space between rows of ornamentals. He spreads about 10 to 12 pounds to the acre.

"That's a pretty small amount of seed, so we've found the best way to seed is with a lawn spreader," said Park. In the past, Park used the spreader and then came back with a cultivator. After trial and error, he improvised a small spiked harrow

to drag behind the 30-inch spreader. The harrow cuts little grooves that make the emerging grass look like it was drilled and, according to Park, the seed seems to germinate better.

Field brome was brought to the United States in the early 1940's from Sweden for testing as a forage grass. But it wasn't until it was tested as a cover crop in the 1950's that its value as a conservation plant was discovered. It is so similar to other, more weedy bromes, however, that it has never gained much popularity for erosion-control plantings.

"When you plant a cover crop, you have to think about whether it will do the job. Then, can you control it? Next—the hardness of it—will it take our winters? Then, of course, its availability—that's the one problem we've had with the field brome," said Park.

Field brome can meet the rest of Park's requirements. It produces a soil-holding root system three times greater than ryegrass. Since it doesn't form seedheads until about 5 weeks later than other brome varieties, it is much easier to control. Growers have until mid-June to work it under, yet the growth is low through the winter with no rank above-ground canopy until spring. Planting time is in September, which gives it time to produce a nice cover mat by the time the fall rains come.

Park started farming here in 1947, growing vegetables. He said he switched to the nursery business in 1955 because

of labor problems. "With nursery stock, if you don't pick it today or next year, it's just worth more money. With vegetables, if there's a delay in harvest, you lose your crop." Park said another advantage of nursery farming is that, unlike growing seasonal crops, it's a year-round job that can provide a year-round income.

Many other farmers in the area evidently agree with Park because a large portion of the State's nursery production comes from this area. Ornamentals, which grow well in the mild climate and heavy rainfall here, are shipped to markets all over the country.

A lot of the ornamentals are grown on hilly or gently sloping fields that are subject to erosion. SCS has placed special emphasis in Multnomah County and six other counties in the area for technical assistance to curb the high rate of erosion. SCS estimates that more than 40,000 tons of soil is lost each year from the nurseries in the area.

More and better use of cover crops could help to bring this loss down to an acceptable rate. Other nursery operators have toured Park's nursery to see the field brome, and many are beginning to take note of its benefits. Park tells them that seeding field brome is one of the best things they could do. It's an idea that he hopes grows.

Shirley Boothby,
retired public affairs specialist, SCS, Portland, Oreg.



At his nursery in Portland, Oreg., Harry Park (left) and SCS Soil Conservationist Jan Jinings examine stand of field brome planted between rows of ornamentals to protect the soil from erosion.

California Volunteers Head for the Hills to Seed Burned Slopes

"One Saturday is not a lot to ask," said Ulli Kummerow about volunteering to help reseed the charred Santa Cruz Mountains in California. "Sometimes, we have to do something larger to feel that we're making a difference."

The July 1985 "Lexington Fire" in California's Santa Cruz Mountains blazed for 10 days, jumping erratically from ridge to ridge, enveloping hillsides with fire and smoke, destroying 24 homes, and damaging scores of other properties. The fire burned over 13,800 acres, caused \$7 million in damages, and cost \$1.2 million to fight.

The fight didn't end when the fire was out. Something had to be done to protect the blackened, bare hillsides from the Pacific storms that pound the Santa Cruz Mountains every winter. Even properties that survived the fire would have been exposed to localized flooding and mudslides, and miles of fish and wildlife habitat would have been destroyed.

Immediately after the fire, Green Again, a homeowners association, requested assistance from SCS and the Evergreen and Santa Cruz County Resource Conservation Districts (RCD's). The SCS and RCD staffs provided information to the property owners about fire damage and erosion control.

SCS hired three temporary emergency-aid employees to help prepare damage reports, organize the erosion-control work, and provide information to concerned groups and the news media. The SCS and RCD staffs conducted a workshop to instruct landowners on how to "erosion proof" their steep slopes, damaged by the fire and fire-fighting equipment.

The Santa Clara Valley Water District, concerned that sediment from the bare hillsides would reach water supply reservoirs, provided grass seed and straw mulch free of charge to landowners who had completed a damage report approved by SCS and the RCD's. The seed was an erosion-control mixture developed by an SCS plant materials specialist working with

the SCS field office staff at Aptos. The seed mixture consisted of Blando brome and 'Hykon' rose clover. For shady areas, creeping red fescue was used instead of the rose clover.

A distribution center for the seed and straw was set up at a fire station of the California Department of Forestry and staffed by the water district 7 days a week. An SCS employee was on hand during peak hours to answer questions about the damage reports and erosion-control recommendations.

Despite the efforts of SCS, the RCD's, and the water district, it became apparent in a few weeks that the job was too big for the landowners to tackle alone. The rainy season normally begins in the mountains in the middle of November, which meant that the seeding would have to be completed by the middle of October.

Many felt helpless. "I don't know. I'm still scratching my head wondering what to do," said one landowner, Hilda Zuck. "It's enough just to put your house back in order. Then—to worry about the land—I can't see the three of us getting out there and covering 4 acres before winter."

In response, the RCD's and SCS recruited volunteers through newspapers and radio and television stations. Shortly after the announcements began, volunteers kept the telephones ringing at the Aptos and Gilroy SCS field offices.

With studio time, equipment, and technical assistance donated by a cable television firm in San Jose, SCS produced a videotape to demonstrate how to apply the seed and mulch. The tape was shown to interested landowners at the seed and straw distribution center, and additional copies were loaned to volunteer groups.

"The media were very sympathetic to our cause," said Richard Casale, SCS district conservationist at the Aptos, Calif., field office.

Workshops were held at which the volunteers were shown an SCS slide show on how to apply the erosion-control measures. Although the volunteers were asked to sign a waiver of liability to protect the landowners, the Santa Clara County Office of Emergency Services offered Workers' Compensation Insurance to those who

completed the training and safety instruction.

Many volunteers came from Boy Scout and Girl Scout troops, churches, high schools, special interest groups, and civic organizations. Some people came from as far as 50 miles away to donate a day or more. The Santa Clara County Sheriff's work crew, consisting of those sentenced to public service work for drunken driving and other offenses, also provided needed help.

As the mid-October seeding deadline approached, the South Bay Sterling Institute of Relationships, a group committed to helping people help each other at the local level, contacted SCS and offered to help organize and recruit volunteers for a 1-day crash project. The group selected Saturday, October 5th, for "Project Mud-buster." With assistance from an SCS public affairs specialist, the group launched a media campaign that drew more than 300 volunteers.

The volunteers were bussed to and from work sites. Rest stations were set up and equipped with food, water, shade, and first aid, all provided by the Red Cross. As television crews and newspaper reporters watched, the volunteers worked all day constructing water bars, smoothing out



Volunteers spread straw on newly seeded areas of burned slopes in the Santa Cruz Mountains in California.

areas disturbed by bulldozers, throwing seed, and spreading straw mulch. As it was spread, the straw changed hundreds of acres from ash and blackness to gold.

"Project Mudbuster" volunteers were rewarded with the breathtaking view from the mountains, the quiet satisfaction of helping to conserve the land, and a celebration with live music and homemade refreshments at the end of the day. Many volunteers said they helped because they had a special feeling about the Santa Cruz Mountains.

In all, volunteers and property owners sowed and covered by hand more than 2,000 acres of the most critical areas with 56,000 pounds of seed and more than 12,700 bales of straw. The California Department of Forestry, in cooperation with SCS and local sponsors, aerially seeded the remaining 12,000 acres with annual ryegrass. By the time the winter rains began, the entire burned area was seeded to new grass.

To help pay for the project, the Santa Clara Valley Water District donated \$50,000, Santa Clara County donated \$50,000, the Soquel Creek Water District donated \$5,000, Santa Cruz County donated \$2,000, and the Green Mountain Project donated \$2,000. This last group, the Green Mountain Project, raised money through raffles, benefit dinners, T-shirt sales, and an old-fashioned firemen's muster.

Obvious benefits of the project include the preservation and protection of the Los Gatos Creek Watershed, Lake Elsman, and the Lexington Reservoir. But the intangible benefits are in the hearts and minds of the volunteers and members of the community who worked together to complete local goals at the local level.

Kummerow and hundreds of other volunteers really did make a difference in California's Santa Cruz Mountains.

Sheryl Mitchell,
former soil conservationist, SCS, Aptos, Calif.

Conservation Helps Rancher Survive Drought

A Montana rancher credits soil and water conservation practices with helping him to survive a prolonged drought.

"Without my grazing system, I would be in much worse shape financially," said Edward J. Grady, Jr. "I probably would have had to sell some cattle like a lot of other people had to do."

Grady is a second-generation rancher in Lewis and Clark County. He usually keeps about 350 cows, 200 yearlings, and 25 bulls on his 13,500-acre ranch in the Canyon Creek area.

Normally, his ranch receives about 15 inches of rainfall a year. But the area withered through nearly 4 years of unusually dry weather, ending with heavy storms in the fall of 1985. Grady was able to get through the drought without even a partial cattle liquidation.

With assistance from the Soil Conservation Service, Grady began developing a conservation grazing system in 1981, before the drought began. The system is part of a long-range plan for his ranch that has included spring developments, improved irrigation systems, fencing, stock water pipelines, and timber harvests.

"My range was in much better condition during the drought than it otherwise would have been," Grady said, "and I didn't have to alter my grazing even though it was the driest period in the area's recent history."

Grady is a cooperator with the Lewis and Clark Conservation District. SCS provides assistance to Grady under the Great Plains Conservation Program, a program created to help farmers and ranchers in the drought-prone Great Plains to protect their light and fragile soils from erosion and to stabilize production. Under the terms of a 10-year contract, Grady receives cost-sharing funds and technical assistance to install the conservation practices called for in his long-range plan.

The improved irrigation systems that Grady installed have boosted hay production and reduced water loss. He now produces more hay than his own herd needs and he sells the surplus to other ranchers. "You have to get more out of

what resources you have," he said, "because expanding your operation is becoming more and more difficult with the increasing financial burden on agriculture."

Initially, Grady thought the cost-sharing funds provided by the Great Plains Program would be more important than the technical help. Now he feels the technical assistance is more important. "Most ranchers and farmers couldn't afford this type of help if they had to seek it through a private consultant," he said.

Matthew J. Ricketts,
soil conservationist, SCS, Helena, Mont.

Irrigation Associations Co-Sponsor Conference and Exposition

An irrigation industry conference and exposition will be held in San Antonio, Tex., December 7-10, 1986. More than 400 exhibitors will greet over 3,500 visitors from more than 50 countries during the 4-day event, which is being co-sponsored by the Irrigation Association, the Texas Turf Irrigation Association, and the Mexican Irrigation Association.

Technical sessions will cover a wide variety of irrigation topics in both agricultural and turf management. Irrigation Association sessions will deal with irrigation scheduling, drip/trickle variations, landscape irrigation, surface irrigation variations, mechanical sprinkler systems, and export market opportunities and procedures. Plans are to translate these sessions into Spanish.

The Irrigation Association will hold two certification examinations for system designers during the San Antonio show. These rigorous tests are part of the Irrigation Association's continuing effort to recognize both turf and agricultural system designers as professionals in the irrigation industry. A Level II examination is set for December 7, and a Level III exam will be held on December 10.

For more information contact the Irrigation Association, 1911 North Fort Myer Drive, Suite 1009, Arlington, Va. 22209, or telephone (703) 524-1200.

Seed Corn Growers Concerned About Wind Erosion

Several seed corn companies in the southwest corner of Michigan's lower peninsula recently joined forces with a conservation district in the fight against wind erosion. Together, the seed corn companies and the St. Joseph County Soil Conservation District are developing erosion-control systems suitable for the production of seed corn on the coarse-textured soils of St. Joseph County.

Wind erosion is not a new problem in the county. Controlling wind erosion was the principal reason for establishing the conservation district 38 years ago. Steady progress had been made until, in recent years, the large sizes of the fields, wide use of clean tillage systems, and lack of crop rotations helped make the wind erosion problem as serious as ever. The Soil Conservation Service estimates that the average soil loss in the county is about 7 tons per acre per year, about two-thirds of which is caused by wind erosion.

About 30,000 acres of the county is in seed corn production. When district

officials discussed the problem with the seed corn growers, they learned that the growers were also concerned about wind erosion. Winds that cause erosion also tear and shred leaf tips, and windblown soil particles scour the waxy surface from young leaves. This damage often slows growth, which upsets pollination by reducing the number of days when fertilization can be achieved.

In the spring of 1985, with strong support and financial assistance from the companies that buy the seed corn from the growers, the district launched the Special Erosion Control Project to monitor the wind erosion and evaluate crop responses to different types of tillage under local conditions. Over the next 3 to 4 years, the district hopes to demonstrate the effectiveness of conservation tillage—compared to conventional clean tillage—in reducing wind erosion on fields used for seed corn production.

Under most conditions, conservation tillage works well for corn. It leaves crop residue that protects the soil from erosion and helps maintain soil moisture. The seed corn growers in St. Joseph County, however, have been reluctant to switch

from conventional clean tillage to conservation tillage because of their concern that the crop residue might increase insect or disease damage.

As part of the project, the district hired a technician who is monitoring 2,665 acres in 22 different fields of seed corn. In addition to collecting information on all aspects of seed corn production that might be affected by conservation tillage, the technician is conducting an in-depth survey of the growers involved. SCS is providing technical assistance.

After the first year of the study, there was no difference in insect or disease damage as a result of conservation tillage. Grower acceptance of the project has been very good; all of the growers involved in the project have requested the district to continue testing the various systems. It appears that the district will be able to identify and develop effective wind erosion control systems that will be readily accepted and adopted by the county's seed corn growers.

Alan G. Herceg,
district conservationist, SCS, Centreville, Mich.



In St. Joseph County, Mich., severe wind erosion fills road ditches with soil and causes other off-site problems. This road ditch was filled during a single windstorm.

Conservation Education

Annual Land, Pasture, and Range Judging Contest Held in Oklahoma

The 35th Annual Land, Pasture, and Range Judging Contest held near Oklahoma City, Okla., April 30–May 1, attracted nearly 900 contestants and coaches from 32 States. The 62 award winners came from 13 different States. The contest was held at historic Fort Reno, a one-time cavalry post.

The contest was divided into three judging events: land judging, pasture and range judging, and homesite evaluation. Each event had three divisions: 4-H and Future Farmers of America (FFA), competing both as teams and individuals; and adults. Contestants evaluated topsoil, subsoil, slopes, and other characteristics, and recommended treatment to improve the land's adaptability for certain purposes.

Trophies were presented to Barbour County, W. Va., 4-H, and Cuba City, Wis., FFA teams in the land judging division. In the pasture and range divisions, the Binger, Okla., 4-H and Snyder, Tex., FFA teams took top honors. The Wabash, Ind., 4-H and Southwood, Ind., FFA teams won in the homesite division.

Top individual winners in the land judging division were Charles Metcalf, Richmond, Ky., adult division; Mike Strodtman, Bucklin, Kans., 4-H division; and Grant Beadles, Thomas, Okla., FFA division. Pasture and range division winners were James Henderson, Snyder, Tex., FFA division; Ali Tilley, Binger, Okla., 4-H division; and Wendell Fenton, Muskogee, Okla., adult division. Homesite division winners were: Titus Filbrun, Carroll County, Ind., FFA division; Sam Truss, Wabash County, Ind., 4-H division; and Craig Ellis, Trenton, Tenn., adult division.

Several agencies and groups helped with the contest, including people from the Oklahoma 4-H, FFA, the Soil Conservation Service, Oklahoma State University, and many other agricultural organizations.

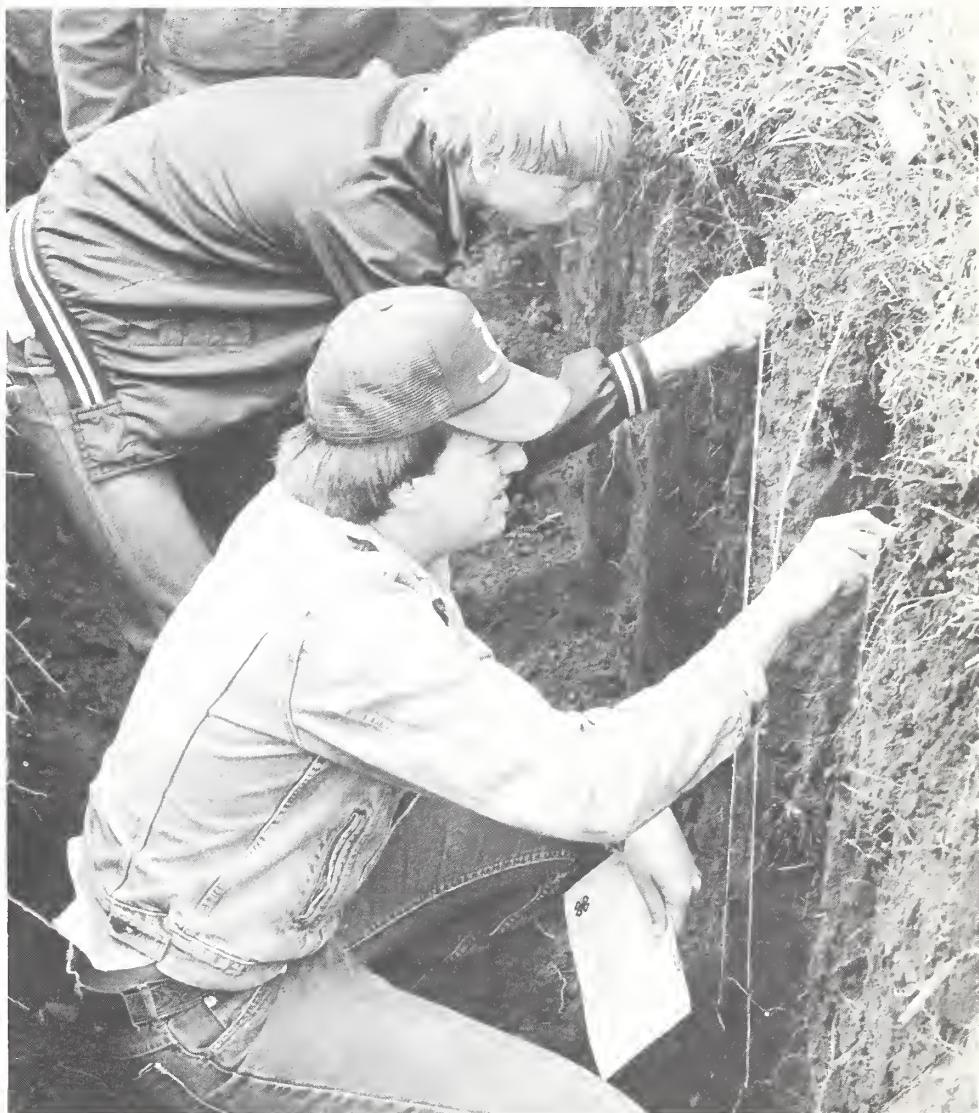
This year's annual honoree was Verlin Hart. Hart has worked on the contest's tabulating committee for the past 13 years, serving as chairman for the past 5 years. Over the years, he has helped to tally

approximately 65,000 contestant score-cards. Hart is an agricultural mechanics specialist and district supervisor for the Oklahoma State Department of Vocational and Technical Education.

Over 900 people attended the awards banquet in Oklahoma City on May 1. More than 200 awards of cash, trophies, and medals were given by the Farm Credit Services, serving Oklahoma, Kansas, Colorado, and New Mexico.

F. Dwain Phillips,
public affairs specialist, SCS, Stillwater, Okla.

In a soil pit, land judging contestants evaluate the topsoil, subsoil, texture, and other factors.



Landfests in Oregon

The Wallowa Soil and Water Conservation District in northeastern Oregon sponsors annual 1-day festivals to increase the public's understanding of the district's conservation programs. These festivals, which are called "landfests," feature speakers, conservation minitours, radio interviews, displays, food, entertainment, and awards programs.

Wallowa County is a scenic county, surrounded by mountains. Agriculture is the main industry. The citizens are concerned about conservation, and many diversified groups cooperate in the festival.

Last year, for example, the Cow Belles and the Wheat Grower's League jointly sponsored a hamburger stand and sold hamburgers for 11 cents each, which represented the farmer's share of the usual hamburger price. The theme for the festival was "Cooperation for Conservation," and it was attended by more than 500 persons.

The district started "Landfest" 3 years ago in part to promote no-till. It has been promoting no-till for several years and now claims the title of "The No-Till Capital of Oregon" with little argument. A dumptruck load of soil was displayed at last year's festival to show how much more soil is lost on an acre of a clean-tilled field than on an acre of a no-till field.

Early in its no-till campaign, the district purchased a no-till drill for use by area farmers. The program was so successful that the district finally sold the drill to avoid competing with local farmers whose success with no-till had led them to buy their own no-till drills, which they use for themselves and also rent to others.

The landfests are held in May. This year's featured a display contest.

Shirley Boothby,
retired public affairs specialist, SCS, Portland, Oreg.

Helping Teachers to Teach Soil and Water Conservation

Walk into an elementary school classroom with a golden eagle and you'll have every student's attention. Walk into that same classroom with a shovelful of soil and you'll have to work a little harder.

Children easily relate to wildlife. Each species is unique and fun to study. Water, too, stimulates a lot of interest. Children play in water, and many swim, fish, or boat in it. But to most children soil is all around, always there, and all looks the same.

Kenneth Rose, area conservationist with the Soil Conservation Service in Hutchinson, Kans., saw a challenge in this situation. He was convinced that the subject of soil and related topics could be made easier to understand for teachers and more interesting for students.

After checking with other SCS employees in Kansas and finding that many shared his concern, Rose formed a committee to study the problem. The committee included a district conservationist, an area resource conservationist, a resource conservation and development coordinator, and the State biologist.

The committee was assisted by Twyla Sherman, associate professor for instruction at Wichita State University (WSU). Sherman and her husband own a farm and understand the need for conservation. In her work with student teachers, she emphasizes resource conservation.

The committee agreed that action was needed in two areas. First, SCS district conservationists should develop more confidence in talking to teachers. The committee felt that SCS field staffs are generally inexperienced in working with teachers in a school setting. Second, the committee recommended that SCS provide teachers with an easy-to-use guide for teaching soil and water conservation.

"Hands-on activities are needed to sell soil and water conservation to teachers," Sherman told a workshop for SCS district conservationists in south-central Kansas. She suggested that, in demonstrating the activities, the conservationists talk to teachers as students. Most teachers are accustomed to this approach in their

in-service training meetings. She also emphasized the need to avoid using too many technical terms.

For the teacher's guide, the committee prepared a 78-page booklet entitled "Conserving Our Soil Resources." This booklet, published by the SCS State office in 1985, presents soil information in the form of lesson plans and classroom activities. Copies of the booklet are provided to teachers at in-service training workshops conducted across the State by district conservationists trained by Richard Hager, SCS State biologist.

The booklet is designed for kindergarten through the sixth grade and describes activities that integrate math, art, music, and social science into conservation education. Sources for the material include a North Dakota teaching manual and two SCS publications, "Conserving Soil" and "Teaching Soil and Water Conservation, a Classroom Field Guide."

There are three major sections in the Kansas booklet. One section deals with soil and how it is formed, one covers soil erosion, and one deals with how soil affects our lives. A fourth section on water conservation is planned.

The booklet begins with a demonstration to answer the question "How much soil is there on the earth to use for growing food?" The demonstration uses an apple to represent the Earth. First, the apple is sliced into fourths, three of which are discarded, as they represent water areas. The last slice is divided in half. One half is discarded as uninhabited deserts, swamps, and arctic areas. The remaining piece is divided into fourths. Three of these pieces are discarded because they represent land that is too rocky, too wet, too hot, or too poor for crop production. The section that is left is one-thirtieth of the original apple. This section is peeled, and the peeling represents the thin layer of soil that is available for producing all of the world's food crops.

According to Rose, this demonstration is proving to be a popular and effective way of getting students to think about soil.

Terry Buettgenbach,
area resource conservationist, SCS, Hutchinson, Kans.

New USDA Program Helps to Put Ag in the Classroom

Ag in the Classroom is a U.S. Department of Agriculture (USDA) program designed to help students learn about agriculture and become citizens who support wise agricultural policies. Ag in the Classroom aims at helping educators to teach more about the source of our food and fiber and the role of agriculture in the total economy and society. Emphasis is on incorporating the following concepts into language, math, science, social studies, art, and other subjects:

- Agriculture issues or events as major influences in human history from making possible the first settled societies to current world food issues.
- What grows where and why.
- How technology and specialization have changed American agriculture in the last 100 years.
- How the agriculture sector works and the interrelationship of U.S. agriculture with the rest of the economy—supply and demand, setting prices, changing factors of production, farming as a business, and agribusiness.
- World food production and distribution and its relationship to American agriculture.
- Careers in agriculture now and in the future.
- Land use and conservation, biotechnology and agriculture, world food supplies, and other issues.

The Ag in the Classroom program is carried out in each State by a group composed of representatives from farm organizations and agribusiness groups, educators, and government officials. Each State is responsible for developing its own program. State groups may operate in different ways in different States depending on the State's need and interest.

USDA's function is to support these State groups. Specifically, the Department's role is to:

- Help States develop effective Ag in the Classroom programs.
- Serve as the central point for exchange of materials and information among the State programs.

- Encourage USDA agencies to assist in local Ag in the Classroom activities.
- Help the State groups assess their efforts to increase agricultural literacy within each State.
- Work closely with national organizations to promote an increased awareness of agriculture among the Nation's students.

USDA publishes a free bimonthly newsletter, *Ag in the Classroom Notes*, which covers program activities around the Nation. To be placed on the mailing list or for more information, contact Shirley Traxler, Room 232-W, U.S. Department of Agriculture, Washington, DC 20250; or telephone (202) 447-5727.

Indiana Conservation District Takes Conservation Education on the Road

The LaPorte County, Ind., Soil and Water Conservation District (SWCD) took its conservation education laboratory on the road in August 1985. The 14- by 7- by 8-foot traveling lab is a converted mobile field office trailer loaned to the SWCD by the Soil Conservation Service. Indiana's first mobile conservation education lab is available by reservation to farms, schools, campgrounds, churches, or any group interested in conservation education.

The Indiana State Soil and Water Conservation Committee provided Information and Demonstration Grant funds to equip the lab with materials and supplies. The lab's curriculum guide, developed by the SWCD and SCS staff, contains detailed outlines and activities for study units on soil, water, ecology, forestry, wildlife, birds, insects, plant life, and weather. The curriculum emphasizes the wise use of natural resources and interrelationships among the air, soil, water, and plant and animal life.

Supplies include soil samplers, soil profile kits, woodland sticks, an increment borer, latex wildlife tracks, water dip nets, a mini-weather station, and a plant press. Charts, a small library, and a puppet theater are also in the trailer.

Educators who reserve the trailer receive the curriculum guide a week ahead of the

mobile lab to enable them to choose and prepare for the activities they want to use with their group. SWCD staff members are available to help.

Valarie Blaschka, LaPorte County SWCD resource conservationist, said that future plans include training Purdue University education students in outdoor teaching techniques so they can accompany the lab to school sites and help teachers use the equipment and activities. "Outdoor learning reinforces lessons learned indoors," said Blaschka. "The mobile conservation education lab will help teachers incorporate hands-on outdoor learning experiences into their lessons."

Melvin Womack,
district conservationist, SCS, LaPorte, Ind.

Mary Cressel,
public affairs specialist, SCS, Indianapolis, Ind.

Moving?

Send present mailing label and new address including zip code to:

U.S. Department of Agriculture
Soil Conservation Service
P.O. Box 2890, Room 6202-S
Washington, DC 20013-2890

Official Business
Penalty for private use, \$300

THIRD-CLASS BULK RATE
POSTAGE AND FEES PAID
USDA-SCS
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New Publications

Cycles of Soil

by Frank J. Stevenson

Transformations caused by micro-organisms have a profound effect on the ability of soils to provide food and fiber for the world's population. Of great importance is the cycling of carbon, nitrogen, phosphorus, sulfur, and the micro-nutrient cations. A knowledge of the various cycles and their interactions is essential for the intelligent use of soil as a medium for plant growth and for the rational use of natural and synthetic fertilizers.

This reference text is a comprehensive, single-volume treatment of the biochemical cycles in soil. It covers all major aspects of nutrient cycling, including fluxes with other ecosystems, biochemical pathways and transformations, gains and losses, chemical fixation reactions, and plant availability.

A broad range of timely topics is discussed, including: management of crop residues and maintenance of soil organic matter; use of soil for disposal of organic wastes; biological nitrogen fixation; denitrification; efficiency of fertilizer nitrogen use by plants; nitrates in food and water; chemistry and fate of phosphorus and sulfur; and behavior of trace elements.

This text may be used as a reference text for graduate and advanced undergraduate courses in soil microbiology and soil biochemistry. It may also be used as a reference for researchers in soil science, microbiology, sanitary engineering, environmental science, and other related disciplines.

Cycles of Soil is available for \$54.95 from John Wiley & Sons, Inc., One Wiley Drive, Somerset, N.J. 08873.

Toward a More Sustainable Agriculture

by Raymond P. Poincelot

The author presents an overview of the agricultural system in the United States and its current status in relation to growth and the future. Poincelot develops three viewpoints: conditions that now exist in the system, goals that reflect issues of specific concern, and potential directions for realistic solutions in the future. Topics include: soil and water conservation, energy conservation, organic farming, and future technology.

Applications of research technology are suggested in the areas of tillage, irrigation, breeding of appropriate crops and animals, and increased support of the farm community through up-to-date technical education.

The 241-page book is available for \$28.50 from AVI Publishing Company, 250 Post Road East, P.O. Box 831, Westport, Conn. 06881.

Potassium in Agriculture

Edited by Robert D. Munson

In *Potassium in Agriculture*, proceedings of an international symposium held in July 1985 in Atlanta, Ga., over 80 internationally recognized authorities discuss such topics as world reserves, sources, mining, refining, technology, marketing, and current and future use of potassium. Basic and practical aspects of potassium soil chemistry and potassium status of soils important to crop production are also discussed along with the fundamentals of potassium absorption by plants and its role in enzyme catalysis, photosynthesis, respiration, assimilate transport, and metabolism.

The interaction of potassium with diseases, other essential elements, varieties, and hybrids, and cultural and management practices is also discussed. Potassium in maximum economic yield systems

is included along with potassium nutrition of major world crops.

The text may serve as a reference tool for researchers and educators alike.

This 1,223-page text is available for \$58 from the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America Headquarters Office, Book Order Department, 677 South Segoe Road, Madison, Wis. 53711.

Conserving Soil: Insights From Socioeconomic Research

Edited by Stephen B. Lovejoy and Ted L. Napier

A national symposium, "Soil and Water Conservation: Implications of Social and Economic Research for Policy Development and Program Implementation," was held in June 1985 in Zion, Ill., to examine the state-of-the-art in socioeconomic research on soil conservation to determine why many farmers do not adopt erosion control practices. The symposium brought together a group of social scientists and others to discuss the commonalities of their research and design strategies for coordinating their research on many of the behavioral aspects of soil conservation.

The book presents the main issues addressed by the presenters at the symposium. It also presents the reactions of a select panel of conservation professionals and summaries of discussion-group sessions attended by symposium participants. While the audience represented a broad range of individuals from agriculture, most participants had some association with conservation programs.

This 155-page book is available for \$8 from the Soil Conservation Society of America, 7515 Northeast Ankeny Road, Ankeny, Iowa 50021.

Mineral Classification of Soils

Edited by J.A. Kittrick

The result of two Soil Science Society of America symposia, this publication brings together the expertise of over 20 recognized authorities to examine the criteria and techniques for soil classification that are the foundation of mineralogy classes. It contains chapters addressing almost all aspects of soil minerals and the ways they affect soil taxonomy. Topics include redefinition of mineral classes, treatment of the problems associated with present mineral classes and control sections, and the establishment of criteria and classes for soils dominated by amorphous and poorly crystalline material, including low activity clays.

This 178-page text is available for \$15 from the Soil Science Society of America and the American Society of Agronomy Headquarters Office, Book Order Department, 677 South Segoe Road, Madison, Wis. 53711.